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ABSTRACT

This study investigated the cognitive and affective student learning outcomes of 36 semesters using the mastery learning approach in distributive education classes. Data were collected by a high school teacher, a junior high school teacher, and a university professor, all of whom used mastery learning. Data collected over the years indicated that students' grades improved with mastery learning. The level of mastery had no effect on students' grades. Students worked to achieve whatever mastery level the teacher designated. Mastery learning produced successful learning experiences for at least 80 percent of the students. The study results supported the concept that mastery learning can be effective in subjects other than those that are hierarchically organized. Evaluation of students' opinions indicated that students took a great deal of pride in their accomplishments under mastery learning. However, teachers had to invest a certain amount of time for mastery learning to succeed. Mastery learning helps all students learn because they know what they are expected to learn, are taught in the most suitable learning style, are given individual correctives needed to alleviate previous learning failures, and receive opportunities to take another test over the same objectives. (SM)

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Mastery Learning: Thousands of Students, Thousands of Excellent Learners

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Introduction

Everyone wants successful schools. Ideas of how to reach this goal range from implementing the newest technology to embracing traditional ways of learning and discipline, but the bottom line is, none of these methods seem to alleviate the unfortunately common student experience of frustration and failure. Educators are changing the cart but whipping the same old horse--no wonder they don't pick up speed! If educators do not change their approach to teaching, students cannot improve their learning. If what educators are doing does not work, then they must change what they are doing. Mastery learning is one positive change toward a new way of teaching and insuring student learning.

Research has shown that implementation of mastery learning techniques in the classroom can produce a significantly higher rate of success in all students than previously experienced. This report provides continuing evidence of the efficacy of mastery learning as in previous studies (Whiting, Render & Devoe, 1979; Whiting & Render, 1982).

The first report examined the notion that the implementation of a mastery learning approach to the teaching of distributive education (DE) would produce 80% successful learning as predicted by mastery learning researchers. Successful learning (achieving a grade of A) was accomplished by up to 97% of the students involved. The mastery learning experience however, was of limited time (one quarter), by an inexperienced teacher in a short term situation (student teaching) and included a limited sample size (N=53).

The second report (Whiting & Render, 1982) reviewed the cognitive and

affective outcomes of nine semesters of a mastery learning approach with 1,279 students in DE classes. The study found successful learning (achieving a grade of A) occurring in up to 98% of the students involved. The successful learning occurred in all students regardless of previous learning success or failure. The 1,279 students had an average cumulative GPA of 2.41, but a 3.92 grade average in DE classes. Of the students involved, 98% expressed positive feelings about the effectiveness of their learning and desire to have other classes taught via mastery learning.

This report investigates the cognitive and affective student learning outcomes of 36 semesters using the mastery learning approach in DE classes (N=7,179). Helping students identify their learning styles (LS) (N=843) resulting in students becoming more efficient in their use of study time and lessening the need for remediation was also investigated and reported. The present report provides strong evidence that a mastery learning approach will result in at least 80% successful learning. This report adds reliability to the previous reports due to a much larger sample (N=7,179).

Procedure

The senior author (Bryan) involved in this program initially taught for six years at the 500-student Brush High School in Brush, Colorado. At that school he taught Consumer Business (CB), Business Law (BL), Economics (Econ), Distributive Education 1 (DE 1) , and Distributive Education 2 (DE 2). Bryan has since moved to the 550-student Glenwood Springs High School in Glenwood Springs, Colorado, where he established another Distributive Education program. At Glenwood Springs he teaches Career Shadowing (CS), DE 1, DE 2, and Coop G. Bryan has used a

Bloom/Block model of mastery learning for a total of 18 years. The data collected has been both extensive and consistent. The second author has used mastery learning at the junior high level and the third author has used mastery learning with university students.

Consumer Business and Career Shadowing are essentially the same one-semester sophomore course; Business Law and Economics are one-semester junior/senior courses; Coop G is a one-year junior course; and DE 2 is a one-year senior course. No prerequisites exist for entry into any of these courses and courses are therefore open to all students. All classes are elective. Individual class size averages are BL=34, Econ=32, DE 1=29, DE 2=21, and Other=24, with a low of 11 and a high of 41. All these classes were taught via the mastery learning approach. The particular approach used is an individual variation of that first developed by Bloom (1968).

On the first day of class, to introduce the mastery learning approach, Bryan gives a handout to each student and spends the class period (one hour) reviewing it and answering questions in an attempt to insure the students' understanding of mastery learning concepts and procedures.

Cognitive Outcomes

The following tables reflect the outcomes of 36 semesters of classes taught via the mastery learning approach.

Table A. Students' cumulative grade point average prior to entering the course and their grade point average in the class taught by mastery learning.

Class	N	Before Mastery Approach	After Mastery Approach
DECA 1	2,946	2.28	3.92
DECA 2	1,657	2.52	3.96
Bus. Law	486	2.61	3.94
Econ.	472	2.63	3.90
Other	1,618	2.08	3.88
Totals	7,179	X = 2.34 Overall GPA	X = 3.92 GPA in DE class

Before - Overall GPA
After - GPA in classes taught by mastery learning
Other includes: consumer Business, Career Shadowing, Coop G
Totals are weighted for N

Table B. Students' grade point average on summative examinations.

Class	N	Average Grade
DECA 1	2,946	96.9% / 3.87
DECA 2	1,657	98.8% / 3.95
Bus. Law	486	97.6% / 3.90
Econ.	472	97.5% / 3.90
Other	1,618	96.1% / 3.84
Totals	7,179	97.2% / 3.84

Table C. Percentage distribution of student course grades (rounded to nearest whole percent).

Class	N	%Achieving Grade of A	% Achieving Grade of B	% Achieving Grade of C	%Achieving Grade of F
DECA 1	2,946	97%	1%	1%	1%
DECA 2	1,657	98	1	0	1
Bus. Law	486	98	1	0	1
Econ.	472	96	2	0	2
Other	1,618	96	1	1	2
Totals	7,179	97 (N=6,963)	1 (N=72)	.5 (N=36)	1.5 (N=108)

Table D. Indicates that the teachers' choice of level of mastery has no effect on the grades the students receive.

	All Classes	N = 2014	N = 1238
	90% = Mastery	95% = Mastery	100% = Mastery
% Achieving A	97%	97%	97%
Time Spent	X	X+11 min.	X+78 min.
Average Test Score	93.2%	97.1%	100%

A small additional investment of time is required to move from a 90% level of mastery to a 95% level. A large additional investment of time is required to move from 95% mastery to 100% mastery level. Obviously it is not a good use of 78 more minutes to move from the 95% mastery level to a 100% level considering that most students will remediate on their own. Also given limitations of teacher-made tests a 5% margin of error is certainly acceptable. Level of mastery has no effect on the grade the student receives. Students will work to achieve whatever mastery level the teacher designates.

Affective Outcomes

The non-overt indicator of affective satisfaction with mastery learning lies in the steady increase in and total number of students voluntarily enrolling in these courses. As is evidenced by the large average class size previously noted, students desired to achieve a successful learning experience. This large enrollment is especially noteworthy considering that in both schools the Distributive Education program did not exist prior to the arrival of Bryan and mastery learning. In addition, a large percentage of students take more than one class offered via this teaching method during their high school careers. This outcome also speaks well

for positive feelings being generated by participation in a mastery learning class. The following responses were to anonymous teacher/course evaluations completed by the students at the end of the courses.:

- 6,873 of 7,179 (97%) students rated their level of learning at 9 or 10 on a 10 point scale.
- 7,054 of 7,179 (98%) students would like other classes taught with mastery learning.
- 7,164 of 7,179 (99+%) felt they received the grade they deserved.
- 4,166 of 7,179 (58+%) indicated they attended this class the same amount of time as their other classes.
- 2,955 of 7,179 (41+%) indicated they attended this class more than other classes.
- 6,869 of 7,179 (97%) felt their knowledge of and success with mastery learning positively affected their learning in other classes.

Average overall GPA after Sophomore year before being exposed to mastery learning was 2.28.

Average post-Senior year cumulative GPA after being exposed to mastery learning at the beginning of their Junior year was 2.86.

Average Senior year only GPA after being exposed to mastery learning at the beginning of their Junior year was 3.42.

In response to the question, "What do you like best about mastery learning," the following are some representative responses:

- Why aren't all classes taught this way?

- I don't have to guess what to study.

- This is the first A I've ever gotten.

- It's easier to learn.

- I look forward to coming to this class.

- I don't cut this class.

- It makes me feel special.

Learning style (LS) experiments with assessment methods (N=843).

Effect on student test scores, during 1st test:

music played	listener LS +4%	non-listener LS-2%
if student hears		
test orally	listener LS +5%	non-listener LS-7%
if student sees test on computer,		
in color, with appropriate graphics	watcher LS +4%	non-watcher LS-6%
if student must repeatedly do some		
overt, physical act	doer LS +5%	non-doer LS-7%

The information above shows that a teacher can help or hinder performance on tests by providing the right or wrong environment as appropriate for the student's individual learning style. Level of change, positively or negatively varies. Level of change is more graphic in a negative fashion. Most doers already do some sort of physical act, even though they are not consciously aware of it, because they are doers and their brains are taking care of them. Environmental components as mentioned above should be included to improve students' performance during testing, but care should be taken that other students are not affected. For example,

doers should not be placed near watchers or the watchers will be distracted by the doers' continual movement.

Furthermore, data indicate that students, over time, become more efficient at learning. They learn more in less time. Regarding study time per unit, outside of class, in preparation for testing, the following was found:

Year 1	Unit 1-134 minutes	Unit 10-73 minutes	Unit 20-42 minutes
Year 2	Unit 1-71 minutes	Unit 10-38 minutes	Unit 20-31 minutes

The previous statement is further strengthened by monitering students' test retaking patterns as follows:

Percent retaking test at least once:

Year 1	Unit 1-62%	Unit 10-28%	Unit 20-17%
Year 2	Unit 1-23%	Unit 10- 8%	Unit 20- 8%

Students become better at learning, more aware of their learning styles, and expect to learn. Over time, mastery learning virtually eliminates the need for prescribed correctives. Prevention has occurred. The students do not require remediation, because they learn better. This allows more time for enrichment, more units, etc. After time, students do not need to retake a test because they did not learn the material, but rather because personal experiences (fighting with parents, working late, returning from basketball trip late, play practice, fighting with girlfriend/boyfriend) hindered their ability to concentrate on the test or make the test a priority.

This report continued to show that mastery learning does produce successful learning experiences for at least 80% of the students. These results accentuate the

fact that the mastery learning approach produced learning far in excess of the 80% success level. More importantly, the results support the concept that mastery learning will be effective in subjects other than those hierarchically organized. The students' success on the summative evaluation (final) which is a 50 question short-answer test that cannot be retaken, illustrates the high level of learning and retention that mastery learning produces. Student success on the final also shows that students are learning throughout the semester and are remediating unlearned material even though they may not have to retake a test. Given the fact that the student must get a 90% or better on every unit, not just a 90% average to receive an A, the students are achieving a high level of learning in all units, as opposed to high in some and low in others. The mastery techniques, when combined with students' familiarity with their own individual learning styles, gives them the tools to succeed in independent learning situations. Students who are aware of their learning styles know how they learn best. The combination of mastery learning and learning style awareness can release more time for enrichment activities, more units, and most importantly allows the teacher opportunity for one-to-one contact.

The grade averages mentioned were semester grades. Grade distributions for first quarter grades were slightly lower (3-6%), and then increased as the students gained confidence and became familiar with the system and teacher. It could also be argued that some grade average benefit may be derived from a smaller school situation.

Another positive affective comment worth noting is that the students take a great deal of pride in their accomplishments under mastery learning. One fellow

teacher reported that, when asked whether students learned a lot in Consumer Business, the students replied,"Of course, we had mastery learning."

Over the course of 36 semesters there have been numerous other indicators of the success of mastery learning. Distributive Education students involved in DECA have consistently not only qualified for, but placed high in DECA District, State and National competitions.

Clearly this report presents compelling information regarding the efficacy of mastery learning. Some could argue that these results are produced by a gifted teacher who would be successful with any method. That may be true, however, we are convinced that mastery learning can make an excellent teacher outstanding, and certainly any teacher more effective.

The use of mastery learning has negative aspects with which the teacher must deal. The investment of time is essential. It takes approximately 15 hours to write one complete unit and get it ready for use. Daily preparation is extensive whether it is preparing an entertaining presentation of the objectives, organizing an activity or grading 150 short answer tests in one night. The writing of higher level cognitive objectives and appropriate test questions is very difficult. Some teachers will not understand mastery learning nor its success and will question the method. Teachers employing mastery learning must be prepared to justify their students' high level of achievement to administrators, other teachers and parents. Many feel that only students with previously demonstrated high aptitudes are capable of learning and consequently only a small percentage of students either should or can

receive an A. Some students expect to fail and it is difficult to fight through this barrier that has been developed and reinforced for many years. One's success with mastery learning may make one less tolerant of poor educators, because it becomes clear that all students, who choose to, can learn if taught in a manner consistent with the way they learn.

There are a number of items that may help a teacher who has decided to implement mastery learning deal with problems and make the transition to mastery learning more successful. It may be desirable to implement mastery learning in one or two subject areas per year because of the time involved. A mastery learning teacher must sincerely believe that all students can and will learn! Every student can be reached if teachers are only smart enough to find the correct way. If teachers allow themselves to believe that some students are not capable of learning, then it becomes too easy for teachers to dismiss a student's failure, and teachers may not try as hard as they should to determine that student's individual learning needs. Teachers implementing mastery learning must expect to succeed. They must not succumb to the temptation to feel a sense of satisfaction when they give a test that many of their students fail. When a student says a course is hard, it is not a compliment. It means that the teacher has not done a very good job of teaching and presenting the material to that particular student. Efficient and successful learning will not seem difficult to the student.

There are many advantages to mastery learning even beyond the 80% success rate that is not only possible but is documented. A teacher will receive tremendous backing and support of students. A concern about adequate enrollment will be

replaced with attempting to get more desks into the room. It is truly uplifting to see such learning success in all students, especially those who have not experienced that feeling before. It is an eye-opening revelation to realize that all students can learn. Potential for students becomes unlimited. Mastery learning teachers develop a great confidence in their own ability, possess very positive self worth and feel good about what they are doing. Because the mastery learning teacher relates achievement directly to the specific student learning objectives, being accountable for grades given or documentation of student learning ceases to become a concern. This is especially true given the students' success on the not-retakable final, summative examination.

This report reinforces the concept that all can and will learn if students know what they are expected to learn, are taught in the learning style best suited to them, are given the individualized correctives needed to alleviate previous learning failures or errors, and are given the opportunitiy to take another test over the same objectives. It seems tragic in a society that cries out for greater achievement on the part of students that mastery learning is used so rarely. If educators want to create high levels of learning in <u>all</u> students, they can feel secure that methods to facilitate growth and learning are available. Educators must believe that all can and will learn, they must believe in their own abilities, and when learning does not approach the optimal, educators must look first at themselves and their methods before they assume that some students cannot be successful.

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